

A MANUFACTURING PROCESS FOR WOODEN BASE WINDOW AND DOOR FRAMES, AND THE FRAMES  
MANUFACTURED BY MEANS OF THE PROCESS

## Description

### Technical Field

The invention relates to a manufacturing process for wood and aluminium, or PVC frames, or frames made of other materials.

The invention also concerns the frames made using the process.

### Background Art

- 5 For some time now the prior art, quite apart from the traditional wooden or aluminium frames, has taught and placed on the market developments of frames comprising components made of both the above-mentioned materials, i.e. the parts of the frame directed internally of the building are made of wood while the parts facing outwards are made of aluminium.
- 10 The main aim of this technology is to combine the beauty and "warmth" of wood with the efficiency and high resistance to atmospheric wear of aluminium.
- The new frame technology is characterised by two large categories, depending on whether the basic element of the resulting structure is made of one or the other of the two materials.
- 15 Where the structure is made of wood and external aluminium protection is then applied thereto, a category which can be termed "wood-aluminium" is defined, whereas where the bearing structure is made of aluminium, to which wooden cladding is applied, another category which can be termed "aluminium-wood" is defined.

Frames belonging to the "wood-aluminium" category are basically obtained using traditional wooden frame principles; they are specially shaped and glued to form the base structure of the frame, whether this is in relation to a fixed frame, a wall, or to a mobile window or door with respect to a fixed frame. The wooden elements of the structures are also subject to mechanical operations, made using specific tools to obtain the details and special shaping required for fitting together with the aluminium protection elements.

Frames made using the above methods are certainly better protected from weathering with respect to traditional wooden frames, but involve increased production costs due to the expensive tools needed, the machinery necessary for creating the special elements, and also because of the level of waste associated with the above-mentioned work operations.

Frames produced using the "aluminium-wood" approach are also characterised by high production costs, largely because production with aluminium technology is more expensive than with wood technology, but also because then wood has to be added to the internal side of the frame. To make matters worse, the end product still has a "mechanical" rather than the "warm" aspect one would traditionally associate with wood.

DE-A-7000649 discloses "A manufacturing process for wood and aluminium window and door frames or frames made of PVC or other materials, comprising the stage of:

- working of solid wood or wood-panel components to create housing with linear transversal shaped for housing metal elements, or PVC elements;
- assembly of the above-mentioned components to create fixed and mobile frames, the assembly being done by joining the cross-pieces and the uprights of the frames using metal corner brackets positioned at the four corners of the frames, and straps or other elements which resist traction, stretched about the

- 2bis -

frames;

- fixture with screw means of the metal or PVC elements (7), in the housing made in the internal sides of the fixed frames and the external frames of the mobile frames;

- application to the fixed and mobile frames of hinges seals and other mechanical components destined to guarantee closure, opening and in general good functioning of the frames”.

DE-U-9308539 discloses a joint for union of cross-pieces and uprights, comprising a tension-rod between movable blocks.

The main aim of the present invention is to provide a manufacturing process for frames in wood and aluminium, or PVC or other materials, which employs simpler machinery and results in lower production costs with respect to present processes.

A further aim of the invention is to provide a manufacturing process for obtaining wood and aluminium, PVC or other material frames which are easy to assemble and just as easily dismounted, so that assembly can be done at the workplace, as well as repairs, maintenance or replacement of components.

A further aim of the invention is to provide wood and aluminium, or PVC or

other material frames which are aesthetically of high quality but which at the same time offer the best possible characteristics of sealing, heat insulation and functional reliability.

The above aims and more besides are achieved with a manufacturing process of frames made of wood and aluminium, PVC or other materials, which includes the following stages:

- working of solid wood or wood-panel components to create housings with linear transversal shapes for housing metal elements, or PVC elements;
- assembly of the above-mentioned components to create fixed and mobile frames, the assembly being done by joining the cross-pieces and the uprights of the frames using metal corner-brackets, positioned at the four corners of the frames, and straps, or other elements which resist traction, stretched about the frames;
- fixture with screw means of the metal or PVC elements, in the housings made in the internal sides of the fixed frames and the external frames of the mobile frames;
- application to the fixed and mobile frames of hinges, seals and other mechanical components destined to guarantee closure, opening and in general good functioning of the frames.

The assembly of the wooden components for realising the fixed and mobile frames of the frames is performed using metal corner-brackets and through-screws arranged obliquely in the corners of the frame.

The housings for the metal elements are transversally L-shaped and made by performing longitudinal cuts with disc saws.

The process of the invention also involves the application of external aluminium (or PVC) protection guards, terminal sides of which are pressure-fitted between the metal elements and the wooden frame, or between the window glass frames

and the wooden frames.

The frames obtained using the above process exhibit high aesthetic qualities thanks to the use of solid wood, or panels, for the composition of the structures of the fixed and mobile frames. They are also made at relatively contained costs with respect to the frames presently under production, as they do not require the use of complex tools or special machine tools for carrying out the work operations to produce the wooden components. The work operations involved produce, among other things, and differently to what occurs at present, rectangular wooden rods or fillets which can be re-used as window glass frames or uprights or cross-pieces for smaller-sized frames. The frames obtained also exhibit the special and advantageous characteristic of being assembled with removable means and components, so that if necessary they can be dismounted, each component of the frame being re-mountable; this leads to enormous savings in maintenance and repair costs.

#### **Disclosure of Invention**

These and other characteristics and advantages of the present invention will better emerge from the detailed description that follows of a preferred but non-exclusive embodiment of the invention, illustrated purely in the form of a non-exclusive and non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a perspective view of a frame obtained according to the manufacturing process of the invention;

figures 2a and 2b are two detailed views of a part of a frame according to the invention;

figures 3, 4 and 5 are sectioned views relating to three possible embodiments of frames according to the invention;

figure 6 is a section performed along line VII-VII of following figure 7, concerning a part of another frame obtainable according to the manufacturing

-5-

process of the invention;

figure 7 is a section made according to line VII-VII of figure 6;

figure 8 is a perspective view of part of a frame made according to a further embodiment of the invention;

5 figure 9 is a median section of figure 8;

figure 10 is a section made according to line XI-XI of following figure 11, relating to a part of a further embodiment of a frame made according to the invention;

figure 11 is a section made according to line X-X of figure 10.

10 With reference to figure 1, 10 denotes a frame of a mobile door of a frame during a manufacturing stage. The frame is composed of two uprights 11, 12 and two cross-pieces, 13 and 14, having an L-shaped transversal profile 15, assembled using metal corner brackets 16 which are arranged at the four corners of the frame, and a strap 17, made of metal and tightened about the uprights and cross-  
15 pieces using known methods.

Figure 2a illustrates a strap 18 which can be stretched between two ends 19, 20 of a threaded pivot 21, arranged obliquely at the corner of the frame 10' and exerting a traction of adequate intensity on the two sides of the corner, achieving a perfect coupling of the two components 11' and 13' of the frame, thanks to the  
20 combined action of the pivot 21, the corner bracket 16 and the strap 18.

A different solution for obtaining the blocking of each single corner of the frame 10' is illustrated in figure 2b. Here a threaded pivot 21' is used, arranged obliquely between the two sides of the corner, together with a corner bracket 16' the ends of which are constrained to pivots 51, 52, which can slide in small  
25 housings 53, 54, entirely lodged in cavities therefor afforded in the wooden components 11', 13', at ends 19', 20' of the pivot 21'. After having fixed the pivot 21' to the two housings 53, 54, with the help of perforated cylinders 55, 56,

similarly used in the previous embodiment, the corner bracket 16' is positioned and the ends thereof constrained to the pivots 51, 52, thus completing the assembly of the corner of the frame 10' by exerting a traction force on the pivots by means of the screws 57, 58 interacting between the housings 53, 54 and two  
5 slidable support shelves 59, 60, of the pivots with respect to the housings 53, 54. The housings 53, 54 comprise slots 61, 62 for passage of the pivot 21' with full freedom of movement, so as to enable easy assembly of the frame even where there may be some constructional differences in the components to be assembled. Before the above-mentioned coupling is done, the glass pane 22 is inserted in the  
10 frame 10. The pane 22 can be inserted, for example, in a groove 23 channelled on the internal side of the uprights and the cross-pieces.

According to the process of the invention, the metal elements for guaranteeing perfect sealing and insulation from the outside are mounted on the external sides of the uprights and cross-pieces; as, for example, illustrated in figure 3. A metal  
15 element 24 is applied to the upright 11, exactly superposed on the strap 17; the element 24 fits flush against a second element 25 applied on the upright of the fixed frame 26, to which the mobile frame 10 is rotatably constrained by a hinge 27.

The housing 28 for the metal elements in the fixed frame 26 exhibits a very linear  
20 transversal conformation; this too is L-shaped and is arranged symmetrically to the other housing 15 exhibited in the mobile frame 10. This considerably simplifies the work needing to be done on the wood components of the frames, as the above housings can be fashioned with longitudinal cuts made using simple disc saws.

25 The embodiment of figure 3 also illustrates a guard 29, 29' made of aluminium for protecting the surfaces of the frame facing the outside of the building. The protection is constrained to the frame by constraining the contacting edges

between the metal elements and the wooden frame. In particular, with reference to the guard 29 of the fixed frame 26, we note that one terminal edge only of the guard is constrained between the element 25 and the wooden frame 26, while the other terminal edge is in contact with the structure 30, to which the fixed frame 26 is anchored. The guard 29' of the mobile frame 11 is constrained to the frame by constraining one of the edges thereof between the element 24 and the wooden frame 11 and constraining the other edge thereof between the glass pane 22 and the frame 11 itself.

Figure 4 illustrates the contact zone between two mobile window frames, 10, 40, of the frame of the invention. The upright 12 of the frame 10 is exactly opposite the other upright 11 of the frame 10, illustrated in figure 3. A metal element 31 is constrained, using screws, to the upright 12; the metal element 31 is also superposed over the strap 17 joining the frame 10, and is conformed such as to join exactly with the metal element 32, constrained to the mobile window frame 40. The metal element 32 also includes a surface 33 which faces externalwise and on which a wooden strip 34 is removably applied.

The strip 34 can be taken from the upright 12 or 11 if the latter are subjected to reworking for obtaining the housings 15, 35 of the elements 24, 31.

Figure 5 is similar to figure 4. In this case, however, a complete thermal insulation between outside and inside is achieved, thanks to the fact that with the metal elements used, differently to what has been described up to now, there is no physical continuity between inside and outside. Even a slight continuity can lead to thermal transmission between the two sides of the frame. There can be no transmission here, because the elements 35, 36 and 37, in contact with the outside environment, are connected to each other by non-metallic connecting elements 41. The heat insulation is completed by specially-shaped rubber seals 46, 47 inserted between the various elements.



In this case too the mobile frames 42, 43 of the frame are assembled using straps 44, 45, made of metal tape, and the housings for the metal elements exhibit a very linear and simplified transversal profile.

Also, instead of the metal straps other traction-resistant elements could be used, such as, for example, steel wire, polyester tapes, propylene, carbon fibre and other materials.

Whatever material used, the advantages of the present invention remain evident, relating to cost of production of the frames and the special dismountable characteristic offered. It is also evident that the characteristics remain the same even where some modifications and variations are applied.

More generally, each joint for union of elements to be used as cross-pieces 130 and uprights 110 can preferably comprise: at least one joint pivot 210 having a tension-rod function, housed snugly and coaxially inside a cylindrical housing 200 predisposed in a coupled cross-piece 130 and upright 110; at least one block 530, 540, for interacting with means which are associable to the ends of the joint pivot 210 for placing the tension-rod in a state of tension. The block 530, 540 is predisposed to be snugly housed in cavities 250 afforded in the cross-piece 130 and the upright 110.

In particular the block 530 is shaped so as to restore the shape of the element, cross-piece 130 or upright 110 when housed in the relative cavity 250 in which the cavity 250 is afforded. At a surface thereof facing externally, the block 530 exhibits portions 510 and 520 of parts or wings of the element, cross-piece 130 or upright 110, so that when inserted in the cavity 250 the parts or wings are not discontinuous over the whole length of the element in which the cavity 250 is afforded. If the element, cross-piece 130 or upright 110 does not exhibit these parts or wings (as in the sides which are brought into contact with or inserted in a wall) the housing 540 is externally cylindrical and straight with the two parallel

flat bases offering holed housings for housing the ends of the joint pivot 210.

Means of known type for placing the tension bar under tension are provided at the ends of the joint pivot 210. Normally the means comprise screws 300 with which an interaction can be actuated between the ends of the joint pivot 210 and the blocks 530, 540 which enable the joint pivot 210 to be placed under tension. The interpositioning of Belleville washers 350 keeps the tension load practically constant.

In the embodiment of figures 10 and 11 the joint is realised using a single block 530, located on the upright 110 since the second end of the joint pivot 210 is threaded and predisposed to screw into a nut predisposed in a pin 550 inserted in a housing afforded on the cross-piece 130.

In each case the blocks 530 and 540 exhibit the characteristic of being delimited by a straight circular cylindrical surface which is specially dimensioned to enable a snug housing thereof in the cavities or the cylindrical housings 250 afforded in the cross-pieces and the uprights 110. The simplicity of the shapes and the extreme design simplicity (in particular the cavities 250) means that manufacturing work on the elements as well as assembly are extremely simple and rapid.

The joining process of the invention also means that wooden profiles made not of solid wood but also of glued-shaving wood elements (chipboard) with various types of wood can also be used, clad with veneer in the on-view parts and with other protective materials (PVC, steel, aluminium etc) in slender sheets in the parts, for example, destined to be exposed to atmospheric agents.

The dimensions of the frames can certainly vary extremely flexibly, as the use of uprights and cross-pieces made of wood with large-size transversal sections involves no change in the manufacturing processes, the machine tools and machinery used.

-10-

The elements could obviously be made of PVC or steel, as could the protection guards applied on the external surfaces of the frame.

The shape of the elements and the seals comprised therein can obviously be changed according to application.